

STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

**IN THE MATTER OF THE COMMISSION’S)
ADVANCED NOTICE OF PROPOSED)
RULEMAKING ON DISTRIBUTED)
RESOURCES.)**

**PRELIMINARY COMMENTS FROM INDIANA STATEWIDE ASSOCIATION
OF RURAL ELECTRIC COOPERATIVES, INC.**

These comments are submitted on behalf of the local district corporation members (“distribution cooperatives”) of the Indiana Statewide Association of Rural Electric Cooperatives, Inc. (“Indiana Statewide”). The two general district corporations that are associate members of Indiana Statewide may submit comments independently of these comments.

Indiana Statewide has formed a working group of distribution cooperative managers to review and consider the Commission’s Advanced Notice of Proposed Rulemaking on Distributed Resources (“Proposed Rulemaking”), and the Distributed Generation White Paper (“White Paper”) prepared by the IURC staff and dated January 25, 2002, but there has not been sufficient time for the working group to respond in detail to the twenty-one (21) questions appearing on page 13 of the White Paper.

Most of Indiana Statewide’s distribution cooperative members have withdrawn from the Commission’s jurisdiction, and Indiana Statewide presumes that any rules that may be adopted by the Commission concerning distributed resources/generation would not be applicable to those distribution cooperatives that have withdrawn from the Commission’s jurisdiction. However, all of Indiana Statewide’s distribution cooperative

members have an interest in and may be indirectly affected by any rules the Commission may adopt concerning distributed resources/generation. Therefore, Indiana Statewide expects to present supplemental comments to the Commission in the near future concerning certain issues about which distribution cooperatives' perspective of these issues may be different from those of investor-owned utilities and other interested parties.

The National Association of Rural Electric Cooperatives ("NRECA") is also actively reviewing issues related to distributed generation. While portions of that review are expected to be completed early this month, the work product of the consultants engaged by the NRECA is still in draft form.

Indiana Statewide's interests and comments can be better identified and focused after Indiana Statewide has examined comments filed by other parties on March 1, 2002. Indiana Statewide expects to be able to submit supplemental comments well prior to the meeting scheduled to be held on May 9, 2002.

Respectfully submitted,

INDIANA STATEWIDE ASSOCIATION OF
RURAL ELECTRIC COOPERATIVES, INC.

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CERTIFICATE OF SERVICE

I hereby certify that the foregoing Preliminary Comments of the Indiana Statewide Association of Rural Electric Cooperatives, Inc. was filed electronically, pursuant to the Commission's January 25, 2002 correspondence regarding Advanced Notice of Proposed Rulemaking on Distributed Resources, this 1st day of March, 2002.

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**INDIANA STATEWIDE ASSOCIATION OF RURAL ELECTRIC
COOPERATIVES, INC.'S SUPPLEMENTAL COMMENTS, AND RESPONSES
TO QUESTIONS IN THE IURC'S JANUARY 25, 2002 DISTRIBUTED
GENERATION WHITE PAPER**

The Indiana Statewide Association of Rural Electric Cooperatives ("Indiana Statewide") submits these comments to supplement its preliminary comments filed March 1, 2002. These comments are presented on behalf of Indiana Statewide's distribution cooperative members. By these supplemental comments, we have responded to the specific questions asked by the Commission staff's "White Paper on Distributed Generation". Central to these comments is the effect any distributed generation rules adopted by the Commission would have on regulated distribution cooperatives because of the characteristics of their systems, and the relatively small number of customers they serve.¹ In particular, the distribution cooperatives' perception of what constitutes a "small" distributed generation customer may be different from that of the larger utilities (see answer to White Paper question n). Even if a simplified application and metering process can be developed for use in areas served by cooperatives, some limitation on the aggregate generation by small DG facilities will be necessary.

¹ Any rules adopted by the Commission could also have a considerable impact on unregulated distribution cooperatives because they have policies similar to those of regulated cooperatives, and all distribution cooperatives compete with investor-owned and municipal utilities for new load with beneficial effect on the entire customer base.

Indiana Statewide notes that the term “distributed generation” and “distributed resources” appears to have been used interchangeably within the comments of certain other parties. In fact, the Commission’s Advanced Notice of Proposed Rulemaking references “distributed resources”, while the Commission staff’s White Paper references “distributed generation”. Indiana Statewide believes the term “distributed resources” is much broader and less easily defined than the term “distributed generation”, and that there are enough issues relating solely to distributed generation that the Commission’s initial rules should embrace only distributed generation, leaving other forms of what might be considered by some to be distributed resources to a future inquiry or rulemaking. Therefore, Indiana Statewide’s comments, including answers to the Commission staff’s White Paper questions, are directed only to distributed generation.

Our answers to the white paper are as follows:

- a. Please provide a definition of distributed generation, including engineering characteristics and unit size. Should the definition differ depending on the customer class?**

Distribution cooperatives believe distributed generation for any use (e.g., peaking or base load) may be appropriately defined as any small-scale power generation technology (e.g., diesels, fuel cells, wind, etc.) that provides electric power at a site closer to customers than central station generation and is owned and operated by or for any retail customer (e.g., residential, commercial or industrial) and may be interconnected to a distribution line. Distribution lines typically operate at a voltage of 25 kV or less, and limit the size of the DG to approximately 10 MW.

Distribution cooperatives see no need for a different definition than above for different customer classes.

- b. Assuming net metering as the first step in a DG rulemaking, what are the benefits for customers with net metering and what are the possible negative effects?**

The benefits for customers with net metering would be in simplification. As long as the price for kWh purchased is the same as kWh sold the meter only has to keep track of the net number in either direction. This means the metering

equipment does not have to track time-of-day usage nor is there a demand component associated with the DG. The result is an arrangement that is much simpler to understand for the customer and easier to track for the utility. The metering equipment is also less sophisticated and therefore less expensive. One negative effect of the net metering approach is that it does not accurately reflect the value of the electricity generated nor does it hold the DG accountable for the reliable operation of the facility. If the facility cannot be counted upon to run consistently and reliably, it cannot be included in the supply plans of the utility. As a result, the actual value of the electricity generated is minimal. In addition, a net metering approach means that any non-generation component included in the standard rate would not be recovered and would result in higher costs to this and other customers.

Net metering has a unique impact on distribution electric utilities such as distribution rural electric cooperatives. While the simple concept of buying back energy at the retail rate for a net metering customer may work for a vertically integrated electric utility, for an REMC or other distribution company with an all-requirement power contract, this “simple” net metering would pose economic disadvantages to the distribution company’s customers. The distribution company would be purchasing power at the retail level to displace power that is purchased at the wholesale level. The non-DG customers would be absorbing this differential in cost by paying for the increase in their purchased power costs on the aggregate level. The generation company would see the benefit of the displaced power, but would not bear any burden of the cost of displacement. All this burden would fall on the non-DG customers of the distribution company.

c. What kind of tariff structure can be used to deal with different amounts and sizes of DG and still make net metering practical?

One approach to rates that could alleviate some of the negative effects would be to separate all of the components of the electric rate (generation, transmission, distribution, administrative, etc.). In this manner the net effect of the approach would only involve the generation component. The distribution costs would be covered and would not be transferred to other customers. There would still be a question as to the actual value of the kWh generated, as there is no guarantee of displaced supply. In order to deal with the size and number issue the costs of engineering studies and facilities above and beyond those normally required should be borne solely by the DG.

d. How should a utility determine the fixed amount of cost per customer with net metering, for both a net buyer and/or net seller?

The fixed costs of connecting a customer are generally the same whether the customer is a net purchaser or net seller. These costs include the actual costs of connecting the customer to the system, the customers share of the operation and maintenance of the system, administrative, and billing. There are also additions

to the standard costs included above to account for the enhanced monitoring and tracking for such facilities.

- e. How do tariffs need to be designed to adequately reflect the efficient recovery of the fixed and variable costs for service to customers that operate DG equipment using a net meter?**

A rate structure should be designed that would require the DG to cover their portion of the costs of the system put in place to serve all customers. The DG should also be responsible for the cost of any special equipment required for interfacing with the distribution system. In addition, for the net metering approach to work effectively there must be some incentive to the customer for generating during times of high market prices. This could be addressed by offering a real-time pricing approach for DG customers. In such tariffs, prices could be established on a day-ahead basis for each hour and the price for any kWh the customer uses or generates would be the same. Finally, the rate should include a reward and/or penalty to incent consistent, reliable operation.

- f. How can stranded costs be identified and measure?**

For large customers, costs for the distribution services can be identified on an individual basis. For small customers (i.e., 5 KW and below) a more generalized approach using average costs is more appropriate, otherwise the burden of an individual cost analysis would be greater than any derived benefit. For instances where the customer is completely isolated from the distribution network, calculation of the stranded cost is easier than where the customer remains connected to the distribution network.

- g. What, if any, are the benefits and revenues that should be considered as offsets to stranded costs?**

Any benefits must be calculated on a time and load sensitive basis. Power delivered into the system during off peak times may cause voltage and relaying problems and overwhelm the native load. Power delivered into the system during peak times may defer distribution expenditures to upgrade the system. The reliability of the distributed generation must also be included in those calculations. The same distributed generation may provide benefits during peak load times and increase distribution costs during non-peak times.

- h. What rate design alternatives would reduce the potential for any stranded costs?**

A rate design where the fixed costs are identified and charged without regard to the amount of energy used or generated would reduce the potential for stranded costs when a distributed generation is connected to the distribution network. The pricing of the energy exchanged for small distributed generations could be on an

average cost for energy leaving the distribution system and at an avoided cost for energy entering the distribution system. For large distributed generations, the charges should be on a time sensitive rate related to the time sensitive avoided costs of the utility.

i. Should standby rates for backup power be used, and if so under what criteria?

Standby rates for back-up power to customers operating their own distributed generation equipment are needed. A physical connection to the distribution system would have to remain. These facilities and associated maintenance costs would need to be recovered from those utilizing DG so as not to pass this burden onto other consumers. These costs could easily be identified in a cost of service analysis and may already be included in the facilities charge.

A mechanism to track the cost incurred by the utility for demand and energy components must also be considered in this rate design. Since the utility may not purchase power to supply these needs, the utility may be exposed to the market to obtain the necessary power. This “market cost” should be tracked and designed into the rate to insure that all costs are recovered during the year.

j. What different kinds of standby services do customers with DG require and can the utility reasonably supply?

Standby services may include, but are not limited to supplemental power, backup power and maintenance power for the DG owner. Other ancillary services that may be needed concern impacts on power quality, short circuit and fault capabilities, voltage, demand and VAR support. Any of these services that are supplied by the utility should be priced to recover costs.

k. In order to determine the necessity and proper design of standby rates we need further information on distribution system design, operations, and cost structure. Please provide any information that might help to develop sufficient standby rates.

The distribution design for rural systems differs from that of IOUs and municipal utilities. In investor-owned and municipal utilities, looped distribution lines are fairly common. Rural electrics have few looped lines due to the nature of the areas they serve. Our typical design starts at the substation, which is sized to handle the load on the feeder lines. Substation capacity for rural systems varies from 5MVA up to 20 MVA and possibly larger if industrial loads are present on a feeder. Feeder lines are the backbone of the distribution system. These lines may connect substation to substation for backup purposes. Main lines and tap lines are run off of these feeder lines. Main lines and tap lines typically are designed as radial lines and are not looped. Transformers, secondary lines, service drops, and meters make up the final piece to deliver power to the customer.

All of these facilities must be in place to provide many of the DG services referenced in paragraph j, above. The costs for these facilities can be identified in the utilities' cost of service studies. Any of these costs that are part of the energy charge must be recovered through a fixed charge to the DG customer.

l. Are there areas in Indiana with distribution constraints?

Yes. Rural electric systems typically develop a two or three year work plan to identify areas that have reached the capacity of its distribution system. Many rural electrics have long feeder lines that are lightly loaded. DG interconnection standards must be developed to in order to maintain safety and reliability. The National Electric Cooperative Association (NRECA) has developed a set of guidelines applicable to rural electric systems. A set of these guidelines is attached for your review.

m. Should utilities be required to file a location-specific set of T & D costs?

We interpret this question to ask whether utilities should be required to file a location specific set of T & D costs for every potential DG customer. Each rural electric cooperative should be able to develop their own system specific set of T & D costs. Distribution costs for rural consumers are much higher than those enjoyed by IOU or municipal utilities and even vary from cooperative to cooperative. It would be extremely difficult and burdensome to allocate distribution costs to each individual location.

n. What constitutes an economically efficient buy-back rate?

It depends on load size. REMCs propose establishing load range categories for small, medium and large customers. A small customer would include loads below 5 KW. Medium loads would range from 5 KW to 1 MW. Large loads would be those 1 MW and above. "Simplified" net metering applications should only apply to renewable and non-renewable fuel sources for small loads. Medium sized loads should be addressed by establishing buy-back rates that reflect capacity, energy and environmental components. Real time pricing would apply to anything above 1 MW sold into the different market hubs.

o. What information should be included in a utility standard application form for distributed generation?

Application guidelines have been established by NRECA, and are indicated by the attached NRECA materials. In addition to the information requested in this application it is recommended that a \$1 million certificate of insurance be required from large DG customers (i.e., 1 MW and above) to protect distribution systems from liability for damages incurred as a result of any equipment failure that would cause personal or property damage.

p. What costs are incurred by a utility to review a DG project?

Cost would include engineering and system studies to determine the impact on transmission, substation, and distribution facilities. Voltage regulation, equipment ratings, voltage control, etc. In addition, ongoing periodic safety inspections should occur on DG equipment as a safe guard to protect line employees and general public from any dangers created by malfunctioning equipment resulting from DG installation.

q. Do these costs vary for different DG project proposals?

Cost could vary significantly depending on the size and scope of a DG project. It will take more resources and time to determine the impact larger applications will have on transmission and distribution systems.

r. How long should it take a utility to evaluate a project?

The length of time to evaluate a project will also vary. Small residential applications should require fewer man-hours than larger commercial, industrial, or stand-alone installations. Time lines could vary from a few days to several months depending on the complexity of the installation.

s. What are the criteria a utility should use to evaluate a DG project?

Integration, safety and avoided cost issues are key factors to consider in evaluating DG projects. The interconnection must provide safe and reliable operation that will not negatively impact existing consumer rates, degradation to the distribution and transmission system or have an adverse impact on the environment. These factors would all be addressed in the application process.



Business and Contract Guide for Distributed Generation (DG) Interconnection

National Rural Electric Cooperative Association

March 18, 2002

Resource Dynamics Corporation

Business and Contract Guide for Distributed Generation (DG) Interconnection

Introduction

Distributed generation (DG) offers opportunities as well as challenges for cooperatives. This Guide is designed to help cooperatives take advantage of the benefits offered by DG while minimizing the possible problems. The business and contractual terms and conditions are the foundation for the successful implementation of DG on cooperative distribution system. This Guide is intended for use by cooperative staff, and not designed for distribution to members or potential DG operators or owners. See **Customer Guidelines for Electric Power Generator Installation and Interconnection** for a ready-to-use customer guide to cooperative requirements.

The **Business and Contract Guide** covers projects that fall into the following categories:

- DG systems up to 3 MW;
- Installations on radial feeder distribution circuits;
- Both rotating (i.e., induction and synchronous) and static power conversion technologies.

This Guide provides a ready-reference on how to deal with customer and third-party generators, from the initial information requirements needed to consider an application, to the detailed contract documents used to close the deal. Cooperative staff that may benefit from use of this Guide includes T&D engineers, DG lawyers and Distribution Managers. Attachments to the Guide include:

- Customer Guide for distribution to consumers expressing an interest in DG;
- Short Form Interconnection Contract for photovoltaic or other DG units less than 3 kW for installation in a home residence or farm;
- Long Form Interconnection Contract for DG units that do not qualify for the Short Form; and,
- An Application Form that must be completed by consumers seeking permission to interconnect.

The model documents included in this Guide will save each cooperative that deals with DG the effort of “reinventing the wheel.” They can help cooperatives to encourage DG on their systems where it benefits the whole system – and to recognize where DG may pose a risk. By allowing cooperatives to be responsive to member requests for interconnection, the documents can help to differentiate cooperatives in the eyes of both consumers and regulators.

While the Guide offers sample application and contract forms, cooperative lawyers should review all terms, conditions and policies to ensure that prudent and proper requirements have been imposed on customer and third-party generators; appropriate liability protection has been incorporated in the final agreement; and, costs are consistent with state and federal law and the cooperative's governing documents. This Guide and all attached documents should be reviewed by the cooperative's counsel, management, and engineers to ensure that it is consistent with the matters already listed as well as with the cooperative's business operations and physical system requirements.

This Guide and the materials attached hereto are only models for convenience of use. They will need to be customized to meet the needs of each cooperative. For example, the contract states that customers will have to maintain adequate insurance as approved by the cooperative. The cooperative should decide ahead of time what amount would be adequate: is a \$10,000 homeowner's policy sufficient or should the customer have \$1,000,000 in coverage? The contract also states that telemetry is required for all generators greater than 200 kW to monitor connection status, real power output and reactive power. The cooperative will need to determine if 200 kW is a reasonable threshold for their system. There are many other similar judgements each cooperative should make.

This Guide and the attached materials are not adequate on their own to support interconnection. Each cooperative will also need to:

- Adopt technical requirements for interconnection. To assist in that process, NRECA has published an **Application Guide for Distributed Generation Interconnection: The NRECA Guide to IEEE 1547**. The Application Guide is available at <http://technet.nreca.org/distribgen.asp>.
- Revisit the cooperative's bylaws or other governing documents to ensure that they require any consumer to obtain the cooperative's approval before installing DG.
- For a distribution cooperative, it is important to examine the role of the G&T and the impact of your all-requirements contract, if you have one. From both engineering and economic perspective, you may want to seek G&T cooperative approval of any contracts with DG Owners/Operators.
- Consider what role the cooperative and the cooperative's G&T (or other wholesale energy supplier) wants DG to play on the system. Before the first customer comes to the cooperative to interconnect, the cooperative will want to ask:
 - Does the G&T need to approve any power purchase agreement from a DG (see prior bullet)?
 - What are the cooperative's obligations under its all-requirements contract or other wholesale power agreement? Note that some G&Ts may want to be a party to the interconnection contract as well to allow it to protect its own interests in the arrangement.
 - Will the cooperative or G&T purchase excess power from consumers?
 - Will the cooperative or G&T wheel excess power for the consumers to other purchasers of the energy?

- Does the cooperative or G&T want the right to dispatch customer-owned generation or otherwise take advantage of the resource for the benefit of the system?
- Draft any policies, rate structures, or contracts necessary to implement the cooperative's business decisions for dealing with DG. NRECA has published the **Manual for Developing Rates for Distributed Generation** to assist cooperatives in that process. The Manual is available at http://www.nreca.org/leg_reg.

Cooperatives also should recognize the impact of DG interconnection on system planning and operation. In this regard, the three options for DG operation include:

<i>Isolated</i>	Not interconnected with the cooperative distribution system, and electrically integrated within the customer's facility such that there is never any electrical connection between the generator output terminals and the cooperative distribution systems lines at the metering point (typically referred to as the point of common coupling).
<i>Paralleled</i>	Electrically interconnected with the cooperative distribution system at the point of common coupling.
<i>Power Exporting</i>	Parallel operation and exporting kilowatts across the point of common coupling up through the distribution system.

Section 1 – The Application Process

The application process is the series of prescribed steps to be taken by a prospective DG owner/operator who desires to operate in parallel with the distribution utility. The utility requires information such as location, technical and design parameters, and operational and maintenance procedures. This is a process where simpler is better: It is intended to be clear, concise and not burdensome on any party, but at the same time must protect the safety and stability of the cooperative distribution system.

This application process provides a systematic approach for the engineering review of a DG interconnection study. The Application forms themselves are discussed below and are included as an Attachment to the Guide. The application forms include the steps that must be taken to properly account for site-specific concerns and address the technical and procedural requirements of the interconnection standard. The goal of this process is to assess the impacts of distributed generation in a clear, unbiased and consistent manner, and to provide the DG applicant with a clear understanding of how the process works and how the interconnection analysis will be conducted.

When conducting the interconnection study, the cooperative should seek to:

- Base study scope on the characteristics of the DG at the proposed location.
- Consider costs incurred and benefits realized as a result of DG interconnection.

- Provide a cost estimate to the DG applicant prior to initiation of any studies, if any study costs are to be charged to the applicant. *Fees and charges for these studies are discussed below.*
- Make written reports and study results available to the DG applicant.
- Use best efforts to meet the application processing schedule, or notify the DG applicant in writing why it cannot meet the schedule and provide estimated dates for application processing and interconnection.

In some cases, the cooperative may reject the proposed DG project interconnection for demonstrable reliability or safety issues. In these cases, however, the cooperative should work closely with the applicant to try to resolve these issues.

The application process actually consists of 3 fundamental process flows:

1. The application is sufficient as submitted, system impact study not required, and approval to interconnect is either granted or refused.
2. System impact study required, but no system upgrade is needed.
3. System impact study required, and system upgrade is needed to accommodate DG.

Each of these process flows is discussed in the following pages.

Figure 1 provides an overview of the full interconnection application process. As shown, the result of the application process will be either:

- Approval of the project;
- Requirement for a system impact study;
- Approval of the DG project interconnection;
- Description of changes to the proposed DG system or to the distribution system necessary to approve the application;
- Rejection of the proposed project with reasons stated.

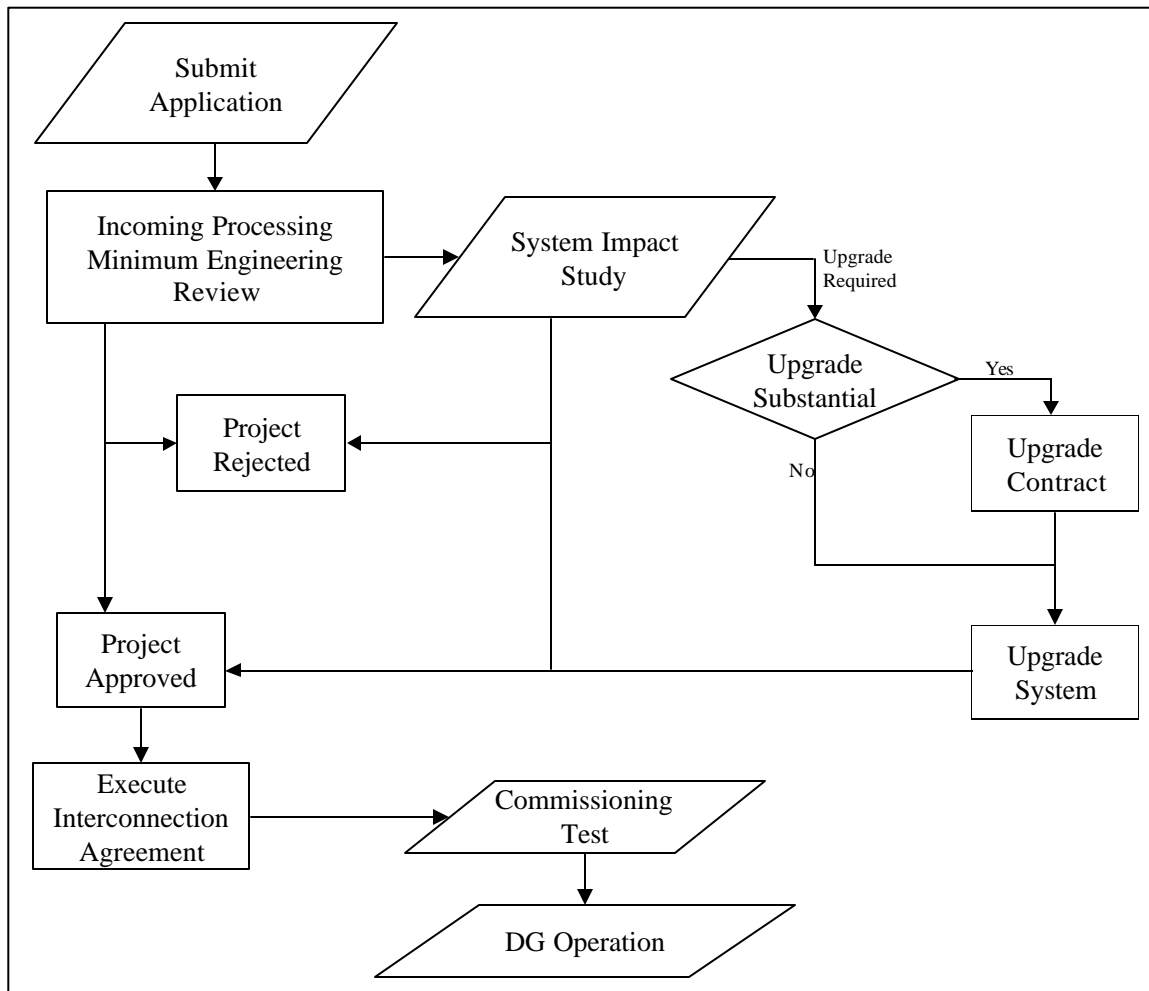


Figure 1. The Interconnection Application Process

Process Flow 1 – Application Sufficient, No System Impact Study

In this case, the cooperative's engineering staff is able to determine from the application whether or not the proposed DG project can be safely interconnected with the distribution system. This is typically the case for small PV systems, or other small systems that will have limited impact on distribution system operations. The relevant process flow is shown in figure 2. The steps include:

- 1) Submit Application – the DG owner/operator submits the application to the cooperative. No application is required for generators up to 5 kW that are not interconnected. Completion of Part 1 of the application is only required for larger generators up to less than 30 kW, as long as there is no power export. Both Parts 1 & 2 must be completed for all other applicants.
- 2) Incoming processing, minimum engineering review – upon receipt of the application, an initial review is performed by the engineering staff at the cooperative.

- 3) Proposed project rejected – engineering review determines that DG project is not acceptable.
- 4) Project approved – engineering review determines that information about the DG project on the application is sufficient and that project may be implemented without further review.
- 5) Execute interconnection agreement – the DG Owner/Operator and the Cooperative representative both sign the interconnection agreement.
- 6) Commissioning test – unit is tested prior to commercial operation to ensure that it meets all safety and performance standards. For small units, factory testing is acceptable. In the case of a factory test, the DG Owner/Operator needs to provide a written description and certification by the factory of the test, the test results, and the qualification of any independent testing laboratory. In addition, the settings of the equipment being installed are to be approved by the Cooperative prior to DG operation.
- 7) DG Operation – DG unit begins operating and supplying power to the distribution system.

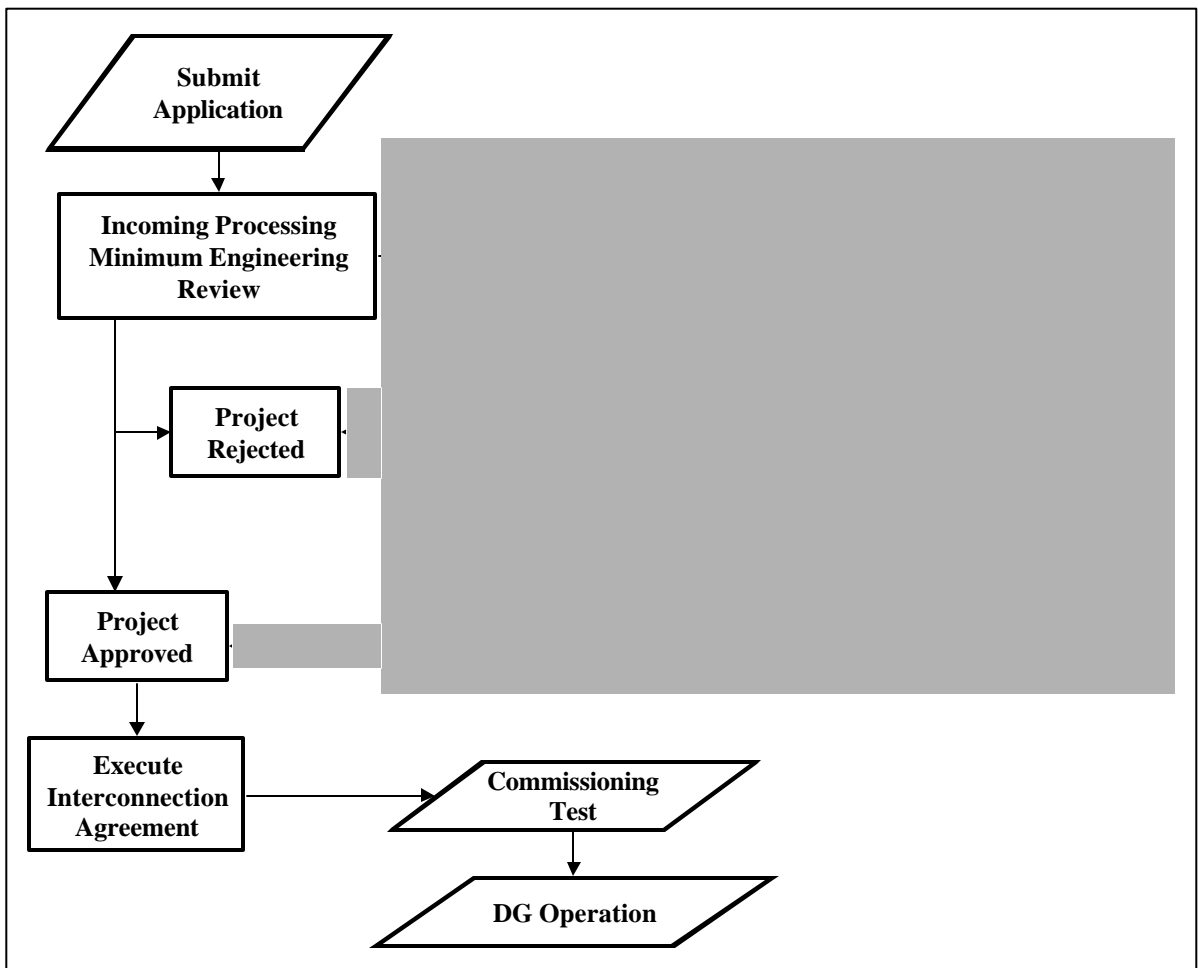


Figure 2. Application Sufficient, No System Impact Study Needed (Process Flow 1)

Process Flow 2 – System Impact Study Required, No System Upgrade

The cooperative engineers need additional information to reach a determination on the ability of the proposed project to safely interconnect with the distribution system. Beyond the information included on the Application, the DG applicant is asked to provide a detailed one-line diagram of the proposed facility and interconnection arrangement that shall include, at a minimum, all major electrical equipment that is pertinent to understanding the normal and contingency operations, including generators, inverters, transformers, switches, circuit breakers, fuses, protective relays and instrument transformers. The major finding in this case is that no upgrades to the distribution system are required to accommodate the DG unit.

The process flow is shown in Figure 3, with the steps summarized below.

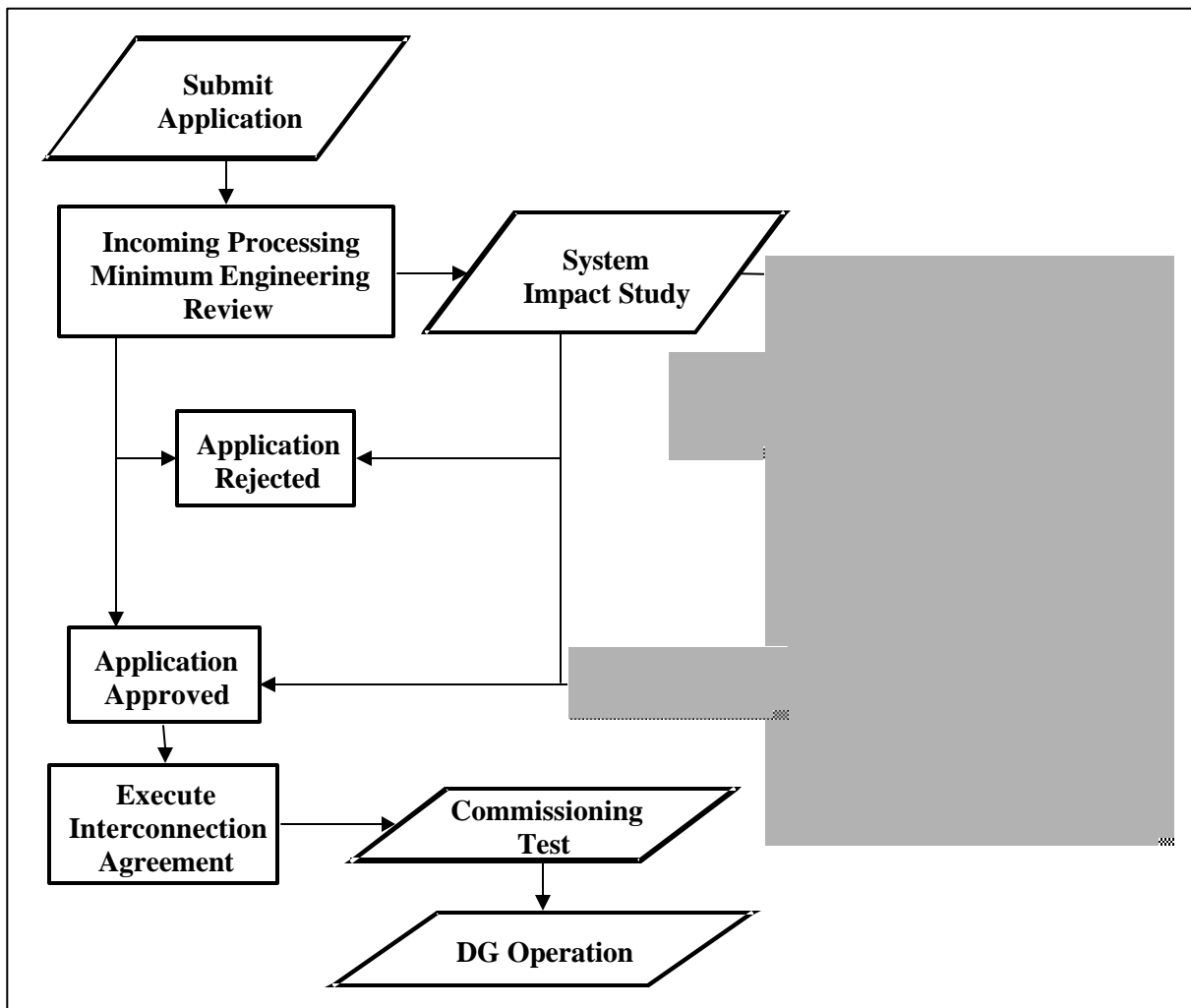


Figure 3. System Impact Study Needed, No System Upgrade

- 1) Submit application – the DG owner/operator submits the application to the cooperative.

- 2) Incoming processing, minimum engineering review – upon receipt of the preliminary application, an initial review is performed by the engineering staff at the cooperative.
- 3) System impact study needed – cooperative determines that further information is necessary before approving application.
- 4) Additional information requested – the DG owner/operator submits the additional data requested by the cooperative.
- 5) Proposed project rejected – engineering review determines that DG project is not acceptable even if distribution system is upgraded.
- 6) Project approved – engineering review determines that information about DG project on application allows project to be implemented without upgrade of distribution system.
- 7) Execute interconnection agreement - the DG Owner/Operator and the Cooperative representative both sign the interconnection agreement.
- 8) Commissioning test – unit is tested prior to commercial operation to ensure that it meets all safety and performance standards. For small units, factory testing is acceptable. In the case of a factory test, the DG Owner/Operator needs to provide a written description and certification by the factory of the test, the test results, and the qualification of any independent testing laboratory. In addition, the settings of the equipment being installed are to be approved by the Cooperative prior to DG operation.
- 8) DG operation – DG unit begins operating and supplying power to the distribution system.

Process Flow 3 – System Impact Study and System Upgrade Required

Typically the case for larger DG units, and frequently for units planning to parallel or export power, distribution system upgrades need to be engineered to allow for the monitoring, dispatch and control of the DG. The process flow is shown in Figure 4 and the steps summarized on pages 9 and 10.

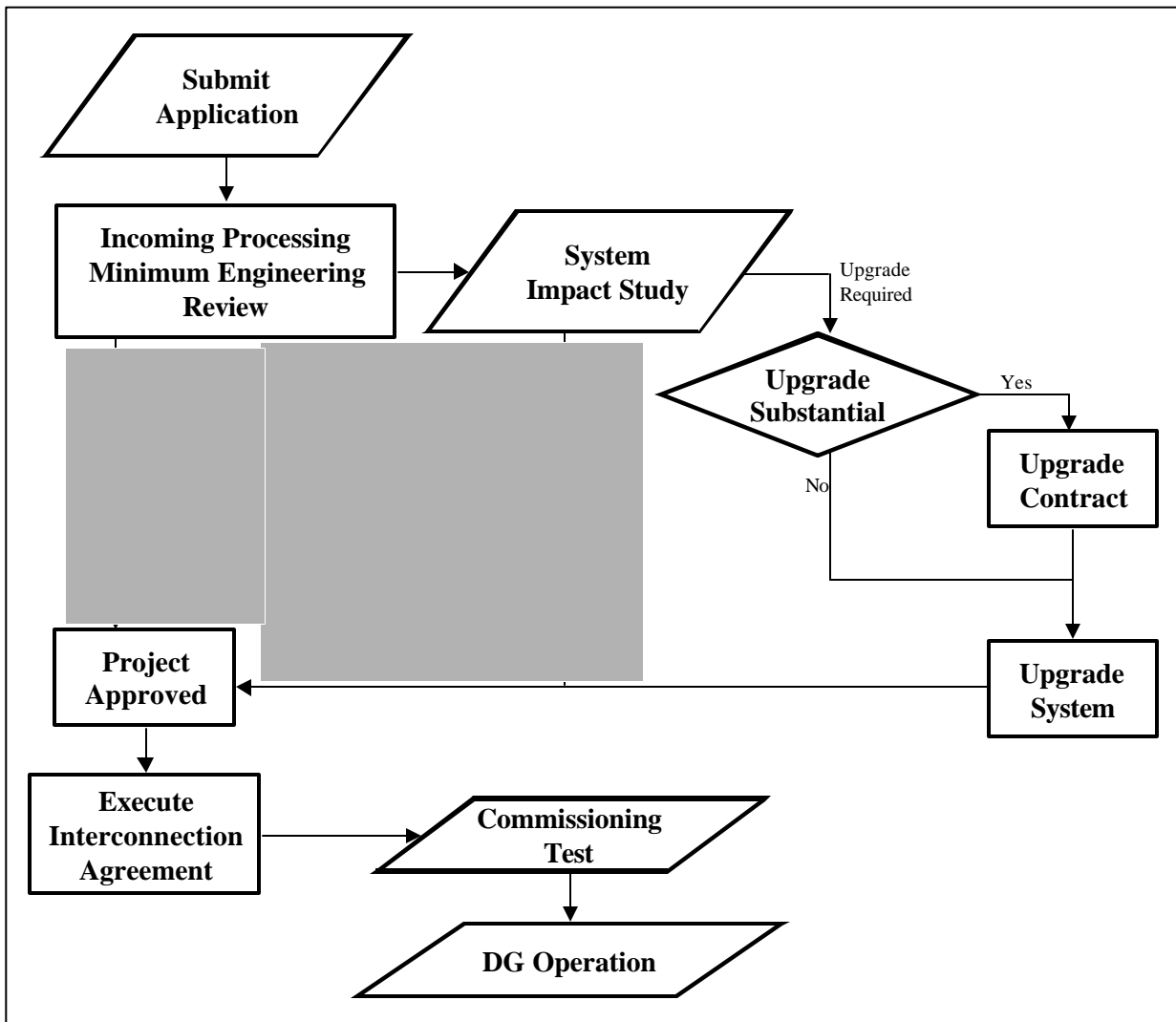


Figure 4. System Impact Study and System Upgrade Required

- 1) Submit Application – the DG owner/operator submits the application to the host distribution utility.
- 2) Incoming processing, minimum engineering review – upon receipt of the preliminary application, an initial review is performed by the engineering staff at the host distribution utility.
- 3) System impact study – cooperative determines that further information is necessary before approving application.

- 4) Additional information requested – the DG owner/operator submits the additional data requested by the cooperative.
- 5) Upgrade necessary – cooperative determines that DG project can be implemented only after distribution system is upgraded.
- 6) Upgrade is substantial – If the upgrade is not substantial, minimum system upgrades will be able to accommodate the DG and the system will be upgraded by the cooperative at no additional cost to the DG owner/operator. If the upgrade is substantial, the DG owner/operator will be required to sign an Upgrade Contract and pay the cost of all system construction needed to accommodate the DG.
- 7) Proposed project approved – Cooperative approves project application after execution of Upgrade Contract or determination that upgrades are not substantial.
- 8) Execute interconnection agreement - the DG Owner/Operator and the Cooperative representative both sign the interconnection agreement.
- 9) Upgrade System – distribution system is upgraded or modified to accommodate the DG unit. The upgrade is accomplished by the cooperative directly after determination that the upgrade is not substantial. If it is substantial, the upgrade commences after the DG owner/operator has signed the Upgrade Contract.
- 10) Commissioning test – unit is tested prior to commercial operation to ensure that it meets all safety and performance standards. For small units, factory testing is acceptable. In the case of a factory test, the DG Owner/Operator needs to provide a written description and certification by the factory of the test, the test results, and the qualification of any independent testing laboratory. In addition, the settings of the equipment being installed are to be approved by the Cooperative prior to DG operation.
- 11) DG Operation – DG unit begins operating and supplying power to the distribution system.

Application Processing Time

The Cooperative has full responsibility for the review, approval or rejection of the DG interconnection application. The approval process is designed to ensure that interconnection of the applicant's DG project will not adversely affect distribution system operations. The approval process needs to occur in a non-discriminatory and timely manner.

As the application process proceeds, certain applications may require minor modifications while they are being reviewed. It is recommended that such minor modifications to a pending application shall not require that it be considered incomplete and treated as a new or separate application.

Upon receipt of a completed application, the cooperative should establish a definitive period of time¹ in which to process the application and provide one of the following notifications to the DG applicant:

- Approval to interconnect;
- Approval to interconnect with a list of prescribed changes to the DG design;
- Justification and cost estimate for prescribed changes to distribution systems that are required to accommodate the DG unit; or,
- Application rejection with justification.

The interconnection process has been designed to specify the appropriate level of review and the associated technical and equipment requirements for each DG project. The intent is for small, low-impact DG projects to be reviewed quickly, the technical and equipment requirements to be only as complex and expensive as required for safe operation, and fees paid by the customer to be fair and justified. The larger the project and the more complex the interconnection scheme, the higher the costs, both for studying the interconnection scheme and for the necessary electrical equipment to interconnect.

Normally, it is anticipated that the application will be submitted, processed, and an interconnection agreement signed before construction activities begin. However, a DG applicant may choose to begin construction earlier, assuming any risk associated with possible rejection of the application. In any case, DG owners/operators must receive cooperative approval before interconnection.

Study Fees

The cooperative engineering department has responsibility to evaluate the impact of a DG interconnection on the distribution system. This evaluation tends to drive the assessment of a study fee. As a general rule, cooperatives would include the cost of a service, coordination, or system impact study within the fee charged for the application review. As a benchmark for cooperatives, the Texas rules require no system impact study and no associated application fee when all of the following for the proposed DG are met:

- equipment is “pre-certified”;
- capacity is 500kW or less;
- equipment is designed to export no more than 15% of the total load on feeder (based on the most recent peak load demand); and,
- equipment will contribute not more than 25% of the maximum potential short circuit current of the feeder.

Pre-certification of equipment is further discussed below. Many cooperative distribution systems are much smaller than the distribution systems of the Texas utilities for which the above rules were originally developed – accordingly, the 500kW guideline may be

¹ 4 – 6 weeks is the suggested time period for this review, and is the time allowed under the Texas interconnection rules. New York allows 4 weeks (20 business days) for “non type tested” systems. In its Rule 21 Model Tariff Language, California allows 20 business days from the time the application is complete, but only for systems that do not meet the requirements for Simplified Interconnection.

too liberal for the typical cooperative system. Additionally, in some cases the DG unit may not be at a strong point on the feeder; in this case, the 15% guideline might be applied at a point on the feeder rather than on its total load.

Suggested application fees and submission requirements are shown below. These fees are representative of fees currently proposed or in force in Texas, New York and California.

DG Size	Operating Characteristics	Application	Application Fee
5 kW or less	Isolated	Not Required	None
>5 kW to 30kW	Isolated	Part 1	\$100
Up to 3 kW	Parallel operation, either power export or no power export	Part 1	\$25
>3kW to 30kW	No power export, parallel operation	Parts 1 & 2	\$500
>3kW to 30kW	Power export	Parts 1 & 2	\$750
>30kW to 100kW	Isolated	Parts 1 & 2	\$250
>30kW to 100kW	No power export, parallel operation	Parts 1 & 2	\$750
>30kW to 100kW	Power export	Parts 1 & 2	\$1,000
>100kW to 1MW	No power export, parallel operation	Parts 1 & 2	\$1,000
>100kW to 1MW	Power export	Parts 1 & 2	\$2,000
>1MW to 3MW	Power export	Parts 1 & 2	\$2,750

These fees are suggested as guidelines to the cooperative, and are designed to at least partially cover the costs of application processing and system impact studies. Cooperatives should set fee levels for their systems they believe are appropriate.

It should be noted that these provisions do not preclude the cooperative from performing a study; they simply regulate when a fee can be charged for the cost of the study. Whether or not a study fee is billable to the applicant, the cooperative may reject an application for demonstrable reliability or safety issues but should work to resolve those issues to the mutual satisfaction of the utility and applicant.

Metering and Telemetry

Metering in general shall track the status (on and off) and kW output of the DG unit. Metering for DG systems greater than 25 kW shall include time tagging of kW output as well. For DG systems greater than 200 kW, telemetry shall be required to monitor real-time output and other DG functions for large and medium generators that are operated remotely. Telemetry is not required if the DG unit is prevented via protective relaying from injecting energy into the cooperative distribution system. Telemetry data shall be available to the cooperative and the communication of such data shall be compatible with the cooperative's communication methods.

Equipment Pre-Certification

An emerging trend in the field of DG interconnection is the “pre-certification” of equipment. This certification is typically accomplished by an equipment “type test” -- a test performed or witnessed once by a qualified independent testing laboratory for a specific protection package or device to determine whether the requirements of the technical interconnection guidelines are met. Equipment manufacturers will typically sponsor the type test.

While the time required to complete the interconnection application process described above will vary to some extent, projects using previously-submitted designs that have been satisfactorily type tested will move through the process more quickly. Applicants submitting type tested systems, however, are not exempt from providing the cooperative with complete design packages necessary for verification of the electrical characteristics of the generator systems, the interconnecting facilities, and their impact on the cooperative distribution system.

**EXCERPTS FROM TEXAS PUBLIC UTILITY
COMMISSION REQUIREMENTS FOR PRE-
CERTIFICATION OF DISTRIBUTED GENERATION
EQUIPMENT BY A NATIONALLY RECOGNIZED
TESTING LABORATORY**

Distributed generation units (DG packages) that are certified to be in compliance by an approved testing facility or organization shall be installed on a company utility system in accordance with an approved interconnection control and protection scheme without further review of their design by the utility. To ensure that the pre-certified DG package is compatible with the utility's system, the utility shall determine the interconnection and control scheme required and shall review and approve the electrical configuration for each DG installation. DG packages that have not been pre-certified may still be interconnected subject to utility review. In this document, a DG package is defined as including the generating unit, the protection and control system and generator breaker. This document does not preclude on-site testing requirements.

PUCT PROJECT NO. 22318
FEBRUARY 2001

Section 2 – Information Requirements

Information is required from the DG owner/developer to allow the cooperative engineer to make an informed decision regarding the impact of the proposed project on the distribution system. The cooperative also has a responsibility to make certain information readily available to the DG applicant.

A range of information is needed from the DG owner/developer as part of the Application. As shown on the application fee schedule, Part 1 of the application is

generally required for small DG projects, with Parts 1 and 2 required for larger, grid-connected projects. Part 1 of the application includes:

- Owner/applicant contact information.
- Project design engineer and/or architect, including contact information.
- Electrical contractor (as applicable).
- Type of generator data (e.g., PV, diesel, gas engine, etc.).
- Inverter performance data.
- Estimated load, generator rating and mode of operation information (e.g., total site load, generator rating, mode of operation, any power for export).
- Description of proposed installation and operation (general description of the proposed installation, its planned location and when you plan to operate the generator).

Part 2 of the application requires some additional data, and more detail on the proposed DG project. Part 2 information requirements include (only as applicable):

- Synchronous or induction generator data.
- Prime mover information (e.g., type, manufacturer, model number, hp, energy source, etc.).
- Transformer, between generator and grid (e.g., manufacturer, type of transformer connections, impedance, reactance, etc.).
- Power circuit breaker (model, voltage, capacity, interrupting rating, etc.).
- Additional information
 - single line diagram, showing the customer's primary switchgear, transformers and generation facilities;
 - general operating description (combined heat and power, closed-transition peak shaving, open-transition peak shaving, emergency power, etc.); and,
 - project location (e.g., address, closest co-op pole number, grid coordinates, etc.).

For *new* facilities, additional information will typically need to be provided, such as data on flicker-producing loads, project construction and commissioning schedule, site location drawings, etc.

For guidance, the cooperative engineer will typically need to provide the following information to the DG owner/operator:

- Preliminary fault duties;
- Cooperative distribution system feeder one-line diagram;
- Operating guidelines;
- System phasing;
- Phase designations; and,
- Method of grounding.

Section 3 – Interconnection Application Forms

The suggested Application Forms are attached.

Section 4 – Contract Forms

The specific contract forms are attached as Appendix A. Contract provisions that are addressed include:

- ✓ Scope of Agreement
- ✓ Establishment of Point of Interconnection
- ✓ Installation, Operation and Maintenance of Facilities
- ✓ Operator in Charge
- ✓ Compliance with Laws, Rules and Tariffs, and Other Cooperative Governing Documents
- ✓ Limitation of Liability
- ✓ Indemnification
- ✓ Design Reviews and Inspections
- ✓ Right of Access
- ✓ Confidentiality of Information
- ✓ Disconnection of Facilities
- ✓ Metering
- ✓ Insurance
- ✓ Effective Term
- ✓ Termination
- ✓ Dispute Resolution
- ✓ Governing Law and Regulatory Authority
- ✓ Severability
- ✓ Amendment
- ✓ Entirety of Agreement
- ✓ Force Majeure
- ✓ Assignment
- ✓ Notices
- ✓ Invoicing and Payment
- ✓ Limitations (No Third-Party Beneficiaries, No Waiver, etc.)
- ✓ Headings
- ✓ Multiple Counterparts

Your Friendly and Caring Member Cooperative

Customer Guidelines for Electric Power Generator Installation and Interconnection

Your electric cooperative seeks to provide its members and patrons with the best electric service possible, and at the lowest cost consistent with sound economy and good management. In some cases, cooperative members and patrons may become interested in installing their own electric power generation equipment. In these cases, your cooperative stands ready to work with you to ensure that your generation equipment is installed in a proper and safe manner, and in accordance with all applicable codes, standards, regulations, laws and insurance requirements. In most of these cases, you will also need to coordinate the installation and approval of your electric power generator with the local code inspection authority. Your cooperative engineers and customer service representatives can also help identify the appropriate contact for this purpose.

Special Accelerated Application Process for Very Small Generators

If you are planning to install photovoltaic (PV) or other generators less than 3 kilowatts (kW) in a home residence or farm, we have established a special streamlined process to make it easy for you to complete the installation.

Not to be Interconnected

If your very small generator is not to be interconnected with the electric power system, all you need to do is give us a call, and provide us with the electrical capacity, manufacturer and name of your electrical installer. We may ask you to send us a copy of your manufacturer information. There is no formal application or fee required.

To be Interconnected

If you are planning to interconnect your generator with the cooperative's electric power distribution system, you need to complete Part 1 of the attached application and submit it to us. A minimal application fee is also required (see fee schedule attached). You also need to sign our streamlined contract form (copy of Short Form contract attached).

Generators Not Interconnected with the Cooperative Distribution System

You may be planning to install a generator for isolated operation, with no connection to the cooperative distribution system. Find your specific situation below.

Small Generator Installation (30 kW or less and not interconnected with the Cooperative Distribution System)

Small Emergency Generator (5,000 watts or less)

If you are considering installation of a small emergency generator, typically running on gasoline or diesel fuel oil, you are probably not planning to interconnect your generator with the cooperative electric power distribution system. It is important that your installation is safe to you, safe to other customers and to our utility workers. It also should not interfere with your electric cooperative's reliable supply of electric power to your residence or other facility. To accomplish this, care must be taken to install your generator so that it will either 1) only start up to serve your entire load when you have disconnected from the electric power grid, or 2) you are only serving isolated loads where there is a choice of power supply (the cooperative system or your emergency generator). Our cooperative engineers are available to help you review your installation plans to ensure that to the greatest extent possible you will not endanger safety or reliability on the cooperative's electrical distribution system. If your generator is 5,000 watts or less, there is no charge for our engineers to review your installation plans.

Generators Up to 30,000 Watts

You may be planning to install a larger emergency generator (greater than 5,000 watts), or a generator up to 30,000 watts (30 kW) for other than emergency operation, and not planning to interconnect your generator with the cooperative electric distribution system. You are required to complete Part 1 of the attached application to notify us of your plans. A small application fee is required. You should also let us know once your generator is up and running.

Generator Installation (greater than 30 kW and not interconnected with the Cooperative Distribution System)

Installation of larger generators within a customer facility has the potential to impact distribution system operations. If you are planning to install a large generator, you must complete Parts 1 and 2 of the attached application and submit it to us so we are aware of your plans. There is a fee associated with this application (see fee schedule attached). We will review your plans to ensure that your installation is not interconnected, and to make certain to the greatest extent possible that your installation will not endanger safety or reliability on the cooperative's electrical distribution system. We want to make sure that your installation will not place our utility workers in any danger of electric shock. We will report back to you with our findings within 12 business days of your application.

Generators Interconnected with the Cooperative Distribution System

When installing a generator and planning to interconnect with the distribution system, we must review your plans to ensure that personnel safety and system reliability will not be compromised.

TO BE CUSTOMIZED BY COOPERATIVE AS APPROPRIATE

If you are interested in selling some or all of the power that you generate, 1) we have/do not have one or more programs in place for the purchase of power from consumers, and/or 2) we are/are not willing to wheel excess power for you.

Generator Installation and Interconnection with the Cooperative Distribution System (all generators)

Customers may wish to install their new generator and interconnect it with the cooperative electric distribution system. In these cases, you need to complete the attached application form and pay the application fee. If your proposed generator installation is 30,000 watts or less and no power will be exported, you only need to complete Part 1 of the application¹. If your generator is more than 30,000 watts, you must complete Parts 1 and 2. A check made out to the Cooperative in the amount of the proper fee must accompany the application. An application fee schedule is attached. Submit your application to your electric cooperative representative as indicated below.

Once we receive your application, we will review your proposed generator installation. If we approve your application, we will let you know if there are special steps you need to take during the generator installation process. We may request additional information regarding your planned installation. We will also ask you to sign a contract in which you agree to operate your generator safely, maintain the unit properly, and maintain insurance as needed. We will furnish you an advance copy of the contract upon request.

You can give us a call at anytime during this review process to find out the status of your application. If your application is not approved for any reason, we will explain the reason and be available to discuss your plans.

As part of our application review process, we will examine the ability of the cooperative electric distribution system to accept your new power generation unit. On certain parts of our system, we may need to replace existing equipment or add some new equipment in order to accommodate customer generation. Your cooperative will then incur costs beyond what is normally required to operate and maintain the system to benefit all members. To be fair to all members, you will need to pay for any system upgrades that will be needed. If this is the case for your planned generator installation, we will advise you of the additional cost, and seek your agreement before approving your application. You will also be asked to sign a system upgrade contract that obligates you to reimburse us for the additional expense incurred on your behalf.

¹ If power export is planned, you must complete Parts 1 and 2 of the Application.

* * * * *

Submit your application to your electric cooperative representative as follows:

Cooperative contact: _____

Title: _____

Address: _____

Phone: _____

Fax: _____

e-mail: _____

ELECTRIC COOPERATIVE

Application for Operation of Customer-Owned Generation

This application should be completed as soon as possible and returned to the Cooperative Customer Service representative in order to begin processing the request. See Customer Guidelines for Electric Power Generator Installation and Interconnection for additional information.

INFORMATION: *This application is used by the Cooperative to determine the required equipment configuration for the Customer interface. Every effort should be made to supply as much information as possible.*

PART 1 OWNER/APPLICANT INFORMATION

Company: _____
Mailing Address: _____
City: _____ County: _____ State: _____ Zip Code: _____
Phone Number: _____ Representative: _____

PROJECT DESIGN/ENGINEERING (ARCHITECT) (as applicable)

Company: _____
Mailing Address: _____
City: _____ County: _____ State: _____ Zip Code: _____
Phone Number: _____ Representative: _____

ELECTRICAL CONTRACTOR (as applicable)

Company: _____
Mailing Address: _____
City: _____ County: _____ State: _____ Zip Code: _____
Phone Number: _____ Representative: _____

TYPE OF GENERATOR (as applicable)

Photovoltaic	_____	Wind	_____	Microturbine	_____
Diesel Engine	_____	Gas Engine	_____	Turbine	_____
Other	_____				

ESTIMATED LOAD, GENERATOR RATING AND MODE OF OPERATION INFORMATION

The following information will be used to help properly design the Cooperative customer interconnection. This information is not intended as a commitment or contract for billing purposes.

Total Site Load _____ (kW)

Residential _____ Commercial _____ Industrial _____

Generator Rating _____ (kW) Annual Estimated Generation _____ (kWh)

Mode of Operation

Isolated _____ Paralleling _____ Power Export _____

DESCRIPTION OF PROPOSED INSTALLATION AND OPERATION

Give a general description of the proposed installation, including a detailed description of its planned location and when you plan to operate the generator.

PART 2

(Complete all applicable items. Copy this page as required for additional generators)

SYNCHRONOUS GENERATOR DATA

Unit Number: _____ Total number of units with listed specifications on site: _____

Manufacturer: _____

Type: _____ Date of manufacture: _____

Serial Number (each): _____

Phases: Single Three R.P.M.: _____ Frequency (Hz): _____

Rated Output (for one unit): _____ Kilowatt _____ Kilovolt-Ampere

Rated Power Factor (%): _____ Rated Voltage (Volts): _____ Rated Amperes: _____

Field Volts: _____ Field Amps: _____ Motoring power (kW): _____

Synchronous Reactance (X_d): _____ % on _____ KVA base

Transient Reactance (X'_d): _____ % on _____ KVA base

Subtransient Reactance (X''_d): _____ % on _____ KVA base

Negative Sequence Reactance (X_s): _____ % on _____ KVA base

Zero Sequence Reactance (X_o): _____ % on _____ KVA base

Neutral Grounding Resistor (if applicable): _____

$I_2^2 t$ or K (heating time constant): _____

Additional information: _____

INDUCTION GENERATOR DATA

Rotor Resistance (R_r): _____ ohms Stator Resistance (R_s): _____ ohms

Rotor Reactance (Xr): _____ ohms Stator Reactance (Xs): _____ ohms
Magnetizing Reactance (Xm): _____ ohms Short Circuit Reactance (Xd''): _____ ohms
Design letter: _____ Frame Size: _____
Exciting Current: _____ Temp Rise (deg C°): _____
Reactive Power Required: _____ Vars (no load), _____ Vars (full load)
Additional information: _____

PRIME MOVER (Complete all applicable items)

Unit Number: _____ Type: _____
Manufacturer: _____
Serial Number: _____ Date of manufacturer: _____
H.P. Rated: _____ H.P. Max.: _____ Inertia Constant: _____ lb.-ft.²
Energy Source (hydro, steam, wind, etc.) _____

GENERATOR TRANSFORMER (Complete all applicable items)

TRANSFORMER (between generator and utility system)

Generator unit number: _____ Date of manufacturer: _____
Manufacturer: _____
Serial Number: _____
High Voltage: _____ KV, Connection: delta wye, Neutral solidly grounded? _____
Low Voltage: _____ KV, Connection: delta wye, Neutral solidly grounded? _____
Transformer Impedance(Z): _____ % on _____ KVA base.
Transformer Resistance (R): _____ % on _____ KVA base.
Transformer Reactance (X): _____ % on _____ KVA base.
Neutral Grounding Resistor (if applicable): _____

INVERTER DATA (if applicable)

Manufacturer: _____ Model: _____
Rated Power Factor (%): _____ Rated Voltage (Volts): _____ Rated Amperes: _____
Inverter Type (ferroresonant, step, pulse-width modulation, etc): _____

Type commutation: forced line
Harmonic Distortion: Maximum Single Harmonic (%) _____
 Maximum Total Harmonic (%) _____

Note: Attach all available calculations, test reports, and oscillographic prints showing inverter output voltage and current waveforms.

POWER CIRCUIT BREAKER (if applicable)

Manufacturer: _____ Model: _____
Rated Voltage (kilovolts): _____ Rated ampacity (Amperes) _____
Interrupting rating (Amperes): _____ BIL Rating: _____
Interrupting medium / insulating medium (ex. Vacuum, gas, oil) _____ / _____
Control Voltage (Closing): _____ (Volts) AC DC
Control Voltage (Tripping): _____ (Volts) AC DC Battery Charged Capacitor
Close energy: Spring Motor Hydraulic Pneumatic Other: _____
Trip energy: Spring Motor Hydraulic Pneumatic Other: _____

Bushing Current Transformers: _____ (Max. ratio) Relay Accuracy Class: _____
Multi ratio? No Yes: (Available taps) _____

ADDITIONAL INFORMATION

In addition to the items listed above, please attach a detailed one-line diagram of the proposed facility, all applicable elementary diagrams, major equipment, (generators, transformers, inverters, circuit breakers, protective relays, etc.) specifications, test reports, etc., and any other applicable drawings or documents necessary for the proper design of the interconnection. Also describe the project's planned operating mode (e.g., combined heat and power, peak shaving, etc.), and its address or grid coordinates.

END OF PART 2

SIGN OFF AREA

The customer agrees to provide the Cooperative with any additional information required to complete the interconnection. The customer shall operate his equipment within the guidelines set forth by the cooperative.

Applicant

Date

ELECTRIC COOPERATIVE CONTACT FOR APPLICATION SUBMISSION AND FOR MORE INFORMATION:

Cooperative contact: _____

Title: _____

Address: _____

Phone: _____

Fax: _____

e-mail: _____

March 11, 2002

**MODEL DISTRIBUTION COOPERATIVE AGREEMENT
FOR
INTERCONNECTION AND PARALLEL OPERATION OF
DISTRIBUTED GENERATION**

LONG FORM CONTRACT

This Interconnection Agreement ("Agreement") is made and entered into this ____ day of _____, 20____, by _____, ("Cooperative"), a corporation organized under the laws of _____, and _____ ("DG Owner/Operator"), each hereinafter sometimes referred to individually as "Party" or both referred to collectively as the "Parties". In consideration of the mutual covenants set forth herein, the Parties agree as follows:

1. **Scope of Agreement** – This Agreement is applicable to conditions under which the Cooperative and the DG Owner/Operator agree that one or more generating facilities (described in Exhibit A) owned by the DG Owner/Operator of ____ kW or less, to be interconnected at ____ kV or less ("Facilities") may be interconnected to the Cooperative's electric power distribution system ("System").

2. **Establishment of Point of Interconnection** – The point where the electric energy first leaves the wires or facilities owned by the Cooperative and enters the wires or facilities provided by DG Owner/Operator is the "Point of Interconnection." Cooperative and DG Owner/Operator agree to interconnect the Facilities at the Point of Interconnection in accordance with the Cooperative's rules, regulations, by-laws, rates, and tariffs (the "Rules") which are incorporated herein by reference. The interconnection equipment installed by the DG Owner/Operator ("Interconnection Facilities") shall be in accordance with the Rules as well.

3. **Responsibilities of Cooperative and DG Owner/Operator for Installation, Operation and Maintenance of Facilities** – DG Owner/Operator will, at its own cost and expense, install, operate, maintain, repair, and inspect, and shall be fully responsible for, its Facilities and Interconnection Facilities, unless otherwise specified on Exhibit A. DG Owner/Operator shall conduct operations of its Facilities and Interconnection Facilities in compliance with all aspects of the Rules and in accordance with industry standard prudent engineering practice. The Cooperative shall conduct operations of its electric distribution facilities in compliance with all aspects of the Rules, or as further described and mutually agreed to in the applicable Facilities Schedule attached hereto as Exhibit A. Maintenance of Facilities and Interconnection Facilities shall be performed in accordance with the applicable manufacturers' recommended maintenance schedule. The DG Owner/Operator agrees to cause its Facilities and Interconnection Facilities to be constructed in accordance with the Rules and specifications equal to or better than those provided by the National Electrical Safety Code and the National Electrical Code, both codes approved by the American National Standards Institute, in effect at the time of construction.

The DG Owner/Operator covenants and agrees to cause the design, installation, maintenance, and operation of, its Facilities and Interconnection Facilities so as to reasonably minimize the likelihood of a malfunction or other disturbance, damaging or otherwise affecting or impairing the System. DG Owner/Operator shall comply with all applicable laws, regulations, zoning codes, building codes, safety rules and environmental restrictions applicable to the design, installation, operation and maintenance of its Facilities and Interconnection Facilities.

Cooperative will notify DG Owner/Operator if there is evidence that the Facilities' or Interconnection Facilities' operation causes disruption or deterioration of service to other customers served from the System or if the Facilities' or Interconnection Facilities' operation causes damage to the System. DG Owner/Operator will notify the Cooperative of any emergency or hazardous condition or occurrence with the DG Owner/Operator's Facilities or Interconnection Facilities, which could affect safe operation of the System.

4. Operator in Charge – The DG Owner/Operator shall each identify an individual (by name or title) who will perform as “Operator in Charge” of the Facilities and the DG Owner/Operator portion of the Interconnection Facilities. This individual must be familiar with this Agreement as well as provisions of the Rules and any other agreements or regulations that may apply.

5. Power Sales to Cooperative - Interconnection of the Facilities with the System does not grant the DG Owner/Operator the right to export power nor does it constitute an agreement by the Cooperative to purchase or wheel excess power.¹

6. Limitation of Liability and Indemnification

a. Notwithstanding any other provision in this Agreement, with respect to the Cooperative's provision of electric service to DG Owner/Operator and the services provided by the Cooperative pursuant to this Agreement, Cooperative's liability to DG Owner/Operator shall be limited as set forth in the Cooperative's tariffs and terms and conditions for electric service, which are incorporated herein by reference.

b. For the purposes of this Agreement, a Force Majeure event is any event: (a) that is beyond the reasonable control of the affected party; and (b) that the affected party is unable to prevent or provide against by exercising reasonable diligence, including the following events or circumstances, but only to the extent that they satisfy the preceding requirements: acts of war, public disorder, rebellion or insurrection; floods, hurricanes, earthquakes, lightning, storms or other natural calamities; explosions or fires; strikes, work stoppages or labor disputes; embargoes; and sabotage. If a Force Majeure event prevents a party from fulfilling any obligations under this agreement, such party will promptly notify the other party in writing and will keep the other party informed on a continuing basis as to the scope and duration of the Force Majeure event. The affected party will specify the circumstances of the Force Majeure event, its expected duration and the steps that the affected party is taking to mitigate the effect of the event on its performance. The affected party will be entitled to suspend or modify its performance of obligations under this Agreement but will use reasonable efforts to resume its performance as soon as possible.

¹ If the DG Owner/Operator wishes to export power, separate agreements must be in place for power purchase and for wheeling.

c. Notwithstanding Paragraph 5.b of this Agreement, the DG Owner/Operator shall assume all liability for and shall indemnify the Cooperative and its members, trustees, directors, officers, managers, employees, agents, representatives, affiliates, successors and assigns for and shall hold them harmless from and against any claims, losses, costs, and expenses of any kind or character to the extent that they result from DG Owner/Operator's negligence or other wrongful conduct in connection with the design, construction, installation, operation or maintenance of the Facilities or Interconnection Facilities. Such indemnity shall include, but is not limited to, financial responsibility for (a) monetary losses; (b) reasonable costs and expenses of defending an action or claim; (c) damages related to death or injury; (d) damages to property; and (e) damages for the disruption of business.

d. Cooperative and DG Owner/Operator shall each be responsible for the safe installation, maintenance, repair and condition of their respective lines, wires, switches, or other equipment or property on their respective sides of the Point of Interconnection. The Cooperative does not assume any duty of inspecting the DG Owner/Operator's lines, wires, switches, or other equipment or property and will not be responsible therefor. DG Owner/Operator assumes all responsibility for the electric service supplied hereunder and the facilities used in connection therewith at or beyond the Point of Interconnection.

e. For the mutual protection of the DG Owner/Operator and the Cooperative, only with Cooperative prior written authorization are the connections between the Cooperative's service wires and the DG Owner/Operator's service entrance conductors to be energized.

7. Testing and Testing Records – The DG Owner/Operator shall provide to the Cooperative all records of testing. Testing of protection systems for intermediate and large units shall be limited to records of compliance with standard acceptance procedures and by industry standards and practices. These records shall include testing at the start of commercial operation and periodic testing thereafter. Factory testing of pre-packaged Interconnection Facilities and the protective systems of small units shall be acceptable. In the case of a factory test, the DG Owner/Operator needs to provide a written description and certification by the factory of the test, the test results, and the qualification of any independent testing laboratory. In addition, the settings of the equipment being installed are to be approved by the Cooperative prior to DG operation.

8. Right of Access, Equipment Installation, Removal & Inspection – The Cooperative may send an employee, agent or contractor to the premises of the DG Owner/Operator at any time whether before, during or after the time the Facilities first produce energy to inspect the Facilities and Interconnection Facilities, and observe the Facility's installation, commissioning (including any testing), startup, operation, and maintenance.

At any time Cooperative shall have access to DG Owner/Operator's premises for any reasonable purpose in connection with the interconnection described in this Agreement, the Rules, or to provide service to its customers.

9. Disconnection of Facilities – DG Owner/Operator retains the option to disconnect its Facilities from the System, provided that DG Owner/Operator notifies the Cooperative of its intent to disconnect by giving the Cooperative at least thirty (30) days' prior written notice. Such disconnection shall not be a termination of this Agreement unless DG Owner/Operator exercises rights under Section 11 that do not lead to a resolution of the issue.

DG Owner/Operator shall disconnect Facilities from the System upon the effective date of any termination resulting from and required by actions under Section 11.

Cooperative shall have the right to disconnect or cause the DG Owner/Operator to disconnect the Facilities from the System and suspend service in cases where continuance of service to DG Owner/Operator will endanger persons or property. During the forced outage of the System serving DG Owner/Operator, Cooperative shall have the right to suspend service and disconnect or cause the DG Owner/Operator to disconnect the Facilities from the System to effect repairs on the System, but the Cooperative shall use its reasonable efforts to provide the DG Owner/Operator with reasonable prior notice.

10. Metering – The Cooperative shall purchase, own, install and maintain such metering equipment as may be necessary to meter the electrical output of the Facilities in accordance with Section 9. All costs associated therewith shall be borne by the DG Owner/Operator. Metering in general shall track the kWh production of the Facilities. Metering shall meet accuracy standards required for equivalent electrical services and can be done with standard meters or any devices that meet data collection and accuracy requirements. For Facilities greater than 200 kW, telemetry shall be required to monitor real-time output and other DG functions for large and medium generators that are operated remotely². Telemetry data shall be available to the Cooperative and the communication of such data shall be compatible with the Cooperative's communication methods.

11. Insurance – DG Owner/Operator shall carry adequate insurance coverage that shall be acceptable to the Cooperative.

12. Effective Term and Termination Rights – This Agreement becomes effective when executed by both Parties and shall continue in effect until terminated. This Agreement may be terminated as follows: (a) DG Owner/Operator may terminate this Agreement at any time by giving the Cooperative at least sixty (60) days' written notice; (b) Cooperative may terminate upon failure by the DG Owner/Operator to generate energy from the Facilities and deliver such energy to the Cooperative within six (6) months after completion of the interconnection; (c) either Party may terminate by giving the other Party at least thirty (30) days prior written notice that the other Party is in default of any of the terms and conditions of the Agreement or the Rules or any rate schedule, tariff, regulation, contract, or policy of the Cooperative, so long as the notice specifies the basis for termination and there is opportunity to cure the default; (d) Cooperative may terminate by giving DG Owner/Operator at least sixty (60) days notice in the event that there is a material change in an applicable law, or any requirement of the Cooperative's wholesale electric suppliers or of any transmission utility, independent system operator or regional transmission organization having responsibility for the operation of any part of the System.

13. Compliance with Laws, Rules and Tariffs – Both the Cooperative and the DG Owner/Operator shall be responsible for complying with the laws of the state of _____, and the Rules. The interconnection and services provided under this Agreement shall at all times be subject to the terms and conditions set forth in the Rules, which Rules are hereby incorporated into this Agreement by this reference. The Cooperative shall have the right to publish changes in any of the Rules at any time.

² Telemetry is not required if it is prevented via protective relaying from injecting energy into the Cooperative distribution system.

14. **Severability** –If any portion or provision of this Agreement is held or adjudged for any reason to be invalid or illegal or unenforceable by any court of competent jurisdiction, such portion shall be deemed separate and independent, and the remainder of this Agreement shall remain in full force and effect.

15. **Amendment** – This Agreement may be amended only upon mutual agreement of the Parties, which amendment will not be effective until reduced to writing and executed by the Parties.

16. **Entirety of Agreement and Prior Agreements Superseded** – This Agreement, including the Rules and all attached Exhibits and Facilities Schedules, which are expressly made a part hereof for all purposes, constitutes the entire agreement and understanding between the Parties with regard to the interconnection of the facilities of the Parties at the Points of Interconnection expressly provided for in this Agreement. The Parties are not bound by or liable for any statement, representation, promise, inducement, understanding, or undertaking of any kind or nature (whether written or oral) with regard to the subject matter hereof not set forth or provided for herein or in the DG Owner/Operator application, or other written information provided by the DG Owner/Operator in compliance with the Rules. It is expressly acknowledged that the Parties may have other agreements covering other services not expressly provided for herein, which agreements are unaffected by this Agreement.

17. **Assignment** – At any time during the term of this Agreement, the DG Owner/Operator may assign this Agreement to a corporation, an entity with limited liability or an individual (the “Assignee”) to whom the DG Owner/Operator transfers ownership of the Facilities; provided that the DG Owner/Operator obtains the consent of the Cooperative in advance of the assignment. The Cooperative’s consent will be based on a determination that the Assignee is financially and technically capable to assume ownership and/or operation of the Facilities. The company or individual to which this Agreement is assigned will be responsible for the proper operation and maintenance of the Facilities, and must agree in writing to be subject to all provisions of this Agreement. Cooperative may also assign the Agreement to another entity with the written approval of the DG Owner/Operator.

18. **Notices** – Notices given under this Agreement are deemed to have been duly delivered if hand delivered or sent by United States certified mail, return receipt requested, postage prepaid, to:

(a) If to Cooperative:

(b) If to DG Owner/Operator:

The above-listed names, titles, and addresses of either Party may be changed by written notification to the other, notwithstanding Section 18.

19. Invoicing and Payment – Invoicing and payment terms for services associated with this Agreement shall be consistent with applicable Rules.

20. Limitations (No Third-Party Beneficiaries, Waiver, etc.) – This Agreement is not intended to and does not create rights, remedies, or benefits of any character whatsoever in favor of any persons, corporations, associations, or entities other than the Parties, and the obligations herein assumed are solely for the use and benefit of the Parties. This Agreement may not be assigned by the DG Owner/Operator without the prior written consent of the Cooperative as specified in Section 16. The failure of a Party to this Agreement to insist, on any occasion, upon strict performance of any provision of this Agreement will not be considered to waive the obligations, rights, or duties imposed upon the Parties.

21. Headings – The descriptive headings of the various articles and sections of this Agreement have been inserted for convenience of reference only and are to be afforded no significance in the interpretation or construction of this Agreement.

22. Multiple Counterparts – This Agreement may be executed in two or more counterparts, each of which is deemed an original but all constitute one and the same instrument.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be signed by their respective duly authorized representatives.

[COOPERATIVE NAME]

[DG OWNER/OPERATOR NAME]

BY: _____

BY: _____

TITLE: _____

TITLE: _____

DATE: _____

DATE: _____

EXHIBIT A
LIST OF FACILITIES SCHEDULES AND POINTS OF INTERCONNECTION

Facility Schedule No.

Name of Point of Interconnection

[Insert Facilities Schedule number and name for each Point of Interconnection]

DG Owner/Operator will, at its own cost and expense, operate, maintain, repair, and inspect, and shall be fully responsible for its Facilities, unless otherwise specified on Exhibit A.

FACILITIES SCHEDULE NO.

[The following information is to be specified for each Point of Interconnection, if applicable]

1. Name:
2. Facilities location:
3. Delivery voltage:
4. Metering (voltage, location, losses adjustment due to metering location, and other:
5. Normal Operation of Interconnection:
6. One line diagram attached (check one): / _____ Yes / _____ No
7. Facilities to be furnished by Cooperative:
8. Facilities to be furnished by DG Owner/Operator:
9. Cost Responsibility:
10. Control area interchange point (check one): / _____ Yes / _____ No
11. Supplemental terms and conditions attached (check one): / _____ Yes / _____ No
12. Cooperative rules for DG interconnection attached (check one): / _____ Yes / _____ No

[COOPERATIVE NAME]

[DG OWNER/OPERATOR NAME]

BY: _____

BY: _____

TITLE: _____

TITLE: _____

DATE: _____

DATE: _____

March 11, 2002

**MODEL DISTRIBUTION COOPERATIVE AGREEMENT
FOR INTERCONNECTION OF DISTRIBUTED GENERATION**

SHORT FORM CONTRACT

This Interconnection Agreement (“Agreement”) is made and entered into this ____ day of _____, 20____, by _____, “Cooperative”), a corporation organized under the laws of _____, and _____ (“DG Owner/Operator”), each hereinafter sometimes referred to individually as “Party” or both referred to collectively as the “Parties”. In consideration of the mutual covenants set forth herein, the Parties agree as follows:

This agreement provides for the safe and orderly operation of the electrical facilities interconnecting the DG Owner/Operator’s facility at (land location or description of project) and the electrical distribution facility owned by the Cooperative.

This Agreement does not supersede any requirements of any by-laws, applicable tariffs, rates, rules and regulations in place between the DG Owner/Operator and the Cooperative.

1. **Intent of Parties:** It is the intent of (the DG Owner/Operator) to interconnect an electric power generator to the Cooperative’s electrical distribution system.

It is the intent of (the Cooperative) to operate the distribution system to maintain a high level of service to their customers and to maintain a high level of power quality.

It is the intent of both parties to operate the facilities in a way that ensures the safety of the public and their employees.

3.2. **Operating authority:** The DG Owner/Operator is responsible for establishing operating procedures and standards within their organization. The operating authority for the DG Owner/Operator shall ensure that the Operator in Charge of the generator is competent in the operation of the electrical generation system and is aware of the provisions of any operating agreements and regulations relating to the safe operation of electrical power systems.

The operating authority for (the DG Owner/Operator) is (name or title of operating

authority, along with address and phone number ~~r title of operating authority, along with address and phone number~~).

4.3. Operator in Charge: The operator in charge is the person identified by name or job title responsible for the real time operation of all electrical facilities related to the interconnection and owned by their organization.

The operator in charge for (the DG Owner/Operator) is (name or title of operator in charge, along with address and phone numbers).

5.4. Suspension of Interconnection: It is intended that the interconnection should not compromise (the Cooperative's) protection or operational requirements. The operation of the (DG Owner/Operator's) System and the quality of electric energy supplied by (the DG Owner/Operator) shall meet the standards as specified by the Cooperative. If the operation of the (DG Owner/Operator's) system or quality of electric energy supplied (in the case of power export) does not meet the standards as specified, then (the Cooperative) will notify (the DG Owner/Operator) to take reasonable and expedient corrective action. (The Cooperative) shall have the right to disconnect the (DG Owner/Operator's) System, until compliance is reasonably demonstrated. Notwithstanding, (the Cooperative) may in its sole discretion disconnect the (DG Owner/Operator's) generating plant from the Distribution Facility without notice if the operating of the Generating Plant imposes a threat, in the cooperative's sole judgement, to life and property.

6.5. Maintenance Outages: Maintenance outages will occasionally be required on the (Cooperative's) system, and the Cooperative will provide as much notice and planning as practical to minimize downtime. It is noted that in some emergency cases such notice may not be practical. Compensation will not be made for unavailability of Cooperative's facilities due to outages.

7.6. Access: Access is required at all times by (the Cooperative) to the (DG Owner/Operator's) plant site for maintenance, operating and meter reading. (The Cooperative) reserves the right, but not the obligation, to inspect the (DG Owner/Operator's) facilities.

8.7. Liability and Indemnification: (DG Owner/Operator) shall assume all liability for and shall indemnify (the Cooperative) for any claims, losses, costs, and expenses of any kind or character to the extent that they result from (DG Owner/Operator)'s negligence or other wrongful conduct in connection with the design, construction or operation of (DG Owner/Operator)'s facility.

9.8. Term: This document is intended to be valid for a period of two (2) years. It may be canceled by either party with not less than 30 days notice to the other party.

AGREED TO BY

DG Owner/Operator

Name

Title: _____

Date: _____

Cooperative

Name

Title: _____

Date: _____